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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Atty. Docket No: 3914-3

In re patent application of

IUCHI, SATOSHI et al.

Serial No. 09/758,269

Filed: January 12, 2001



For: TRANSGENIC PLANTS CARRYING NEOXANTHIN CLEAVAGE ENZYME GENE

STATEMENT TO SUPPORT FILING AND SUBMISSION IN  
ACCORDANCE WITH 37 C.F.R. §§ 1.821-1.825

Assistant Commissioner for Patents  
Washington, D.C. 20231

**Box SEQUENCE**

Sir:

In connection with a Sequence Listing submitted concurrently herewith, the undersigned hereby states that:

1. the submission, filed herewith in accordance with 37 C.F.R. § 1.821(g), does not include new matter;

2. the content of the attached paper copy and the attached computer readable copy of the Sequence Listing, submitted in accordance with 37 C.F.R. § 1.821(c) and (e), respectively, are the same; and

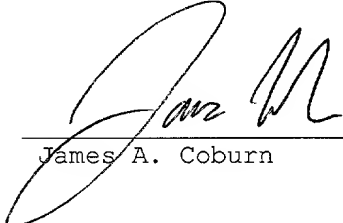
3. all statements made herein of their own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United

Serial No. 09/758,269

States Code and that such willful false statements may jeopardize the validity of the application or any patent resulting therefrom.

Respectfully submitted,

June 25, 2001  
Date

  
James A. Coburn

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## SEQUENCE LISTING

<110> IUCHI, SATOSHI  
KOBAYASHI, MASATOMO  
SHINOZAKI, KAZUO

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 Pro Tyr Ala Val Arg Leu Thr Glu Ser Gly Asp Ile Glu Thr Ile Gly  
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 Arg Tyr Asp Phe Asp Gly Lys Leu Ala Met Ser Met Thr Ala His Pro  
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 Lys Thr Asp Pro Ile Thr Gly Glu Thr Phe Ala Phe Arg Tyr Gly Pro  
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 Val Pro Pro Phe Leu Thr Tyr Phe Arg Phe Asp Ser Ala Gly Lys Lys  
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 Asp Phe Ala Ile Thr Lys Arg His Ala Ile Phe Ala Glu Ile Gln Leu  
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 Val Gly Thr Asp Asn Gly Lys Thr Pro Arg Leu Gly Val Ile Pro Lys  
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 Tyr Ala Gly Asp Glu Ser Glu Met Lys Trp Phe Glu Val Pro Gly Phe  
 385 390 395 400  
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 Arg Met Asp Leu Val His Ala Leu Val Glu Lys Val Lys Ile Asp Leu  
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 Val Thr Gly Ile Val Arg Arg His Pro Ile Ser Ala Arg Asn Leu Asp  
 450 455 460  
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 465 470 475 480  
 Tyr Ala Ala Ile Gly Asp Pro Met Pro Lys Ile Ser Gly Val Val Lys  
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 Met Tyr Gly Ser Gly Cys Tyr Gly Gly Glu Pro Phe Phe Val Ala Arg  
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Asp Pro Gly Asn Pro Glu Ala Glu Glu Asp Asp Gly Tyr Val Val Thr  
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Tyr Val His Asp Glu Val Thr Gly Glu Ser Lys Phe Leu Val Met Asp  
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Ala Lys Ser Pro Glu Leu Glu Ile Val Ala Ala Val Arg Leu Pro Arg  
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 Gly Asn His Thr Gln Pro Pro Leu Ser Ser Ser Gln Ser Ser Asp Leu  
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agt tat tgt agc tcc tta cct atg gcc agt cgt gtc aca cgt aag ctc 144  
 Ser Tyr Cys Ser Ser Leu Pro Met Ala Ser Arg Val Thr Arg Lys Leu  
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aat gtt tca tct gcg ctt cac act cct cca gct ctt cat ttc cct aag 192  
 Asn Val Ser Ser Ala Leu His Thr Pro Pro Ala Leu His Phe Pro Lys  
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caa tca tca aac tct ccc gcc att gtt gtt aag ccc aaa gcc aaa gaa 240  
 Gln Ser Ser Asn Ser Pro Ala Ile Val Val Lys Pro Lys Ala Lys Glu  
 65 70 75 80

tcc aac act aaa cag atg aat ttg ttc cag aga gcg gcg gcg gca gcg 288  
 Ser Asn Thr Lys Gln Met Asn Leu Phe Gln Arg Ala Ala Ala Ala Ala  
 85 90 95

ttg gac gcg gcg gag ggt ttc ctt gtc agc cac gag aag cta cac ccg 336  
 Leu Asp Ala Ala Glu Gly Phe Leu Val Ser His Glu Lys Leu His Pro  
 100 105 110

ctt cct aaa acg gct gat cct agt gtt cag atc gcc gga aat ttt gct 384  
 Leu Pro Lys Thr Ala Asp Pro Ser Val Gln Ile Ala Gly Asn Phe Ala  
 115 120 125

ccg Pro	gtg Val	aat Asn	gaa Glu	cag Gln	ccc Pro	gtc Val	cgg Arg	cgt Arg	aat Asn	ctt Leu	ccg Pro	gtg Val	gtc Val	gga Gly	aaa Lys	432
130					135					140						
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165					170					175						
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225					230					235					240	
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245					250					255						
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260					265					270						
act Thr	ccc Pro	aat Asn	gga Gly	gat Asp	tta Leu	aaa Lys	acc Thr	gtt Val	ggg Gly	cgg Arg	ttc Phe	gat Asp	ttt Phe	gat Asp	gga Gly	864
275					280					285						
caa Gln	tta Leu	gaa Glu	tcc Ser	aca Thr	atg Met	att Ile	gcc Ala	cac His	ccg Pro	aaa Lys	gtc Val	gac Asp	ccg Pro	gaa Glu	tcc Ser	912
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305					310					315					320	
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325					330					335						
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Met Ile Arg Gly Gly Ser Pro Val Val Tyr Asp Lys Asn Lys Val Ala	
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Arg Phe Gly Ile Leu Asp Lys Tyr Ala Glu Asp Ser Ser Asn Ile Lys	
385 390 395 400	
tgg att gat gct cca gat tgc ttc tgc ttc cat ctc tgg aac gct tgg	1248
Trp Ile Asp Ala Pro Asp Cys Phe Cys Phe His Leu Trp Asn Ala Trp	
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gaa gag cca gaa aca gat gaa gtc gtc gtg ata ggg tcc tgt atg act	1296
Glu Glu Pro Glu Thr Asp Glu Val Val Val Ile Gly Ser Cys Met Thr	
420 425 430	
cca cca gac tca att ttc aac gag tct gac gag aat ctc aag agt gtc	1344
Pro Pro Asp Ser Ile Phe Asn Glu Ser Asp Glu Asn Leu Lys Ser Val	
435 440 445	
ctg tct gaa atc cgc ctg aat ctc aaa acc ggt gaa tca act cgc cgt	1392
Leu Ser Glu Ile Arg Leu Asn Leu Lys Thr Gly Glu Ser Thr Arg Arg	
450 455 460	
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Pro Ile Ile Ser Asn Glu Asp Gln Gln Val Asn Leu Glu Ala Gly Met	
465 470 475 480	
gtc aac aga aac atg ctc ggc cgt aaa acc aaa ttc gct tac ttg gct	1488
Val Asn Arg Asn Met Leu Gly Arg Lys Thr Lys Phe Ala Tyr Leu Ala	
485 490 495	
tta gcc gag ccg tgg cct aaa gtc tca gga ttc gct aaa gtt gat ctc	1536
Leu Ala Glu Pro Trp Pro Lys Val Ser Gly Phe Ala Lys Val Asp Leu	
500 505 510	
act act gga gaa gtt aag aaa cat ctt tac ggc gat aac cgt tac gga	1584
Thr Thr Gly Glu Val Lys Lys His Leu Tyr Gly Asp Asn Arg Tyr Gly	
515 520 525	
gga gag cct ctg ttt ctc ccc gga gaa gga gga gag gaa gac gaa gga	1632
Gly Glu Pro Leu Phe Leu Pro Gly Glu Gly Gly Glu Glu Asp Glu Gly	
530 535 540	
tac atc ctc tgt ttc gtt cac gac gag aag aca tgg aaa tcg gag tta	1680
Tyr Ile Leu Cys Phe Val His Asp Glu Lys Thr Trp Lys Ser Glu Leu	
545 550 555 560	
cag ata gtt aac gcc gtt agc tta gag gtt gaa gca acg gtt aaa ctt	1728
Gln Ile Val Asn Ala Val Ser Leu Glu Val Glu Ala Thr Val Lys Leu	
565 570 575	

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Asn Val Ser Ser Ala Leu His Thr Pro Pro Ala Leu His Phe Pro Lys  
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Gln Ser Ser Asn Ser Pro Ala Ile Val Val Lys Pro Lys Ala Lys Glu  
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Leu Asp Ala Ala Glu Gly Phe Leu Val Ser His Glu Lys Leu His Pro  
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Pro Val Asn Glu Gln Pro Val Arg Arg Asn Leu Pro Val Val Gly Lys  
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Leu Pro Asp Ser Ile Lys Gly Val Tyr Val Arg Asn Gly Ala Asn Pro  
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Leu His Glu Pro Val Thr Gly His His Phe Phe Asp Gly Asp Gly Met  
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Val His Ala Val Lys Phe Glu His Gly Ser Ala Ser Tyr Ala Cys Arg  
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Phe Thr Gln Thr Asn Arg Phe Val Gln Glu Arg Gln Leu Gly Arg Pro  
 195 200 205

Val Phe Pro Lys Ala Ile Gly Glu Leu His Gly His Thr Gly Ile Ala  
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Arg Leu Met Leu Phe Tyr Ala Arg Ala Ala Ala Gly Ile Val Asp Pro  
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 Ala His Gly Thr Gly Val Ala Asn Ala Gly Leu Val Tyr Phe Asn Gly  
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 Arg Leu Leu Ala Met Ser Glu Asp Asp Leu Pro Tyr Gln Val Gln Ile  
 260 265 270  
 Thr Pro Asn Gly Asp Leu Lys Thr Val Gly Arg Phe Asp Phe Asp Gly  
 275 280 285  
 Gln Leu Glu Ser Thr Met Ile Ala His Pro Lys Val Asp Pro Glu Ser  
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 Gly Glu Leu Phe Ala Leu Ser Tyr Asp Val Val Ser Lys Pro Tyr Leu  
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 Lys Tyr Phe Arg Phe Ser Pro Asp Gly Thr Lys Ser Pro Asp Val Glu  
 325 330 335  
 Ile Gln Leu Asp Gln Pro Thr Met Met His Asp Phe Ala Ile Thr Glu  
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 Met Ile Arg Gly Gly Ser Pro Val Val Tyr Asp Lys Asn Lys Val Ala  
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 385 390 395 400  
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 Pro Pro Asp Ser Ile Phe Asn Glu Ser Asp Glu Asn Leu Lys Ser Val  
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 Pro Ile Ile Ser Asn Glu Asp Gln Gln Val Asn Leu Glu Ala Gly Met  
 465 470 475 480  
 Val Asn Arg Asn Met Leu Gly Arg Lys Thr Lys Phe Ala Tyr Leu Ala  
 485 490 495  
 Leu Ala Glu Pro Trp Pro Lys Val Ser Gly Phe Ala Lys Val Asp Leu  
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 Thr Thr Gly Glu Val Lys Lys His Leu Tyr Gly Asp Asn Arg Tyr Gly  
 515 520 525

Gly Glu Pro Leu Phe Leu Pro Gly Glu Gly Gly Glu Glu Asp Glu Gly  
530 535 540

Tyr Ile Leu Cys Phe Val His Asp Glu Lys Thr Trp Lys Ser Glu Leu  
545 550 555 560

Gln Ile Val Asn Ala Val Ser Leu Glu Val Glu Ala Thr Val Lys Leu  
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Asp Leu Ala Lys Gln Val Val  
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aga ccc tcc aag ggt ttc tcc tcg aag ctt ctc gat ctt ctc gag aga 96  
Arg Pro Ser Lys Gly Phe Ser Ser Lys Leu Leu Asp Leu Leu Glu Arg  
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ctt gtt gtc aag ctc atg cac gat gct tct ctc cct ctc cac tac ctc 144  
Leu Val Val Lys Leu Met His Asp Ala Ser Leu Pro Leu His Tyr Leu  
35 40 45

tca ggc aac ttc gct ccc atc cgt gat gaa act cct ccc gtc aag gat 192  
Ser Gly Asn Phe Ala Pro Ile Arg Asp Glu Thr Pro Pro Val Lys Asp  
50 55 60

ctc ccc gtc cat gga ttt ctt ccc gaa tgc ttg aat ggt gaa ttt gtg 240  
Leu Pro Val His Gly Phe Leu Pro Glu Cys Leu Asn Gly Glu Phe Val  
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Arg Val Gly Pro Asn Pro Lys Phe Asp Ala Val Ala Gly Tyr His Trp  
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ttt gat gga gat ggg atg att cat ggg gta cgc atc aaa gat ggg aaa 336  
Phe Asp Gly Asp Gly Met Ile His Gly Val Arg Ile Lys Asp Gly Lys  
100 105 110

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Ala Thr Tyr Val Ser Arg Tyr Val Lys Thr Ser Arg Leu Lys Gln Glu  
115 120 125

gag Glu	ttc Phe	ttc Phe	gga Gly	gct Ala	gcc Ala	aaa Lys	ttc Phe	atg Met	aag Lys	att Ile	ggt Gly	gac Asp	ctt Leu	aag Lys	ggg Gly	432
130						135			140							
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145			150						155			160				
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			165						170			175				
gta Val	tat Tyr	cac His	cat His	gga Gly	aaa Lys	ctt Leu	cta Leu	gca Ala	tta Leu	cag Gln	gag Glu	gca Ala	gat Asp	aag Lys	ccg Pro	576
			180			185						190				
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			195			200						205				
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210						215			220							
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225			230						235			240				
cca Pro	cct Pro	tat Tyr	ctc Leu	aca Thr	tac Tyr	aga Arg	gtt Val	atc Ile	tcg Ser	aaa Lys	gat Asp	ggc Gly	att Ile	atg Met	cat His	768
			245						250			255				
gac Asp	cca Pro	gtc Val	cca Pro	att Ile	act Thr	ata Ile	tca Ser	gag Glu	cct Pro	atc Ile	atg Met	atg Met	cat His	gat Asp	ttt Phe	816
			260			265						270				
gct Ala	att Ile	act Thr	gag Glu	act Thr	tat Tyr	gca Ala	atc Ile	ttc Phe	atg Met	gat Asp	ctt Leu	cct Pro	atg Met	cac His	ttc Phe	864
275						280						285				
agg Arg	cca Pro	aag Lys	gaa Glu	atg Met	gtg Val	aaa Lys	gag Glu	aag Lys	aaa Lys	atg Met	ata Ile	tac Tyr	tca Ser	ttt Phe	gat Asp	912
290						295			300							
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305			310						315			320				
gaa Glu	ctt Leu	atg Met	att Ile	aga Arg	tgg Trp	ttt Phe	gag Glu	ctt Leu	ccc Pro	aac Asn	tgc Cys	ttt Phe	att Ile	ttc Phe	cac His	1008
			325						330			335				
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340						345						350				

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 Arg Leu Glu Asn Pro Asp Leu Asp Met Val Ser Gly Lys Val Lys Glu  
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 aaa ctc gaa aat ttt ggc aac gaa ctg tac gaa atg aga ttc aac atg 1152  
 Lys Leu Glu Asn Phe Gly Asn Glu Leu Tyr Glu Met Arg Phe Asn Met  
 370 375 380  
  
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 Lys Thr Gly Ser Ala Ser Gln Lys Lys Leu Ser Ala Ser Ala Val Asp  
 385 390 395 400  
  
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 Phe Pro Arg Ile Asn Glu Cys Tyr Thr Gly Lys Lys Gln Arg Tyr Val  
 405 410 415  
  
 tat gga aca att ctg gac agt atc gca aag gtt acc gga atc atc aag 1296  
 Tyr Gly Thr Ile Leu Asp Ser Ile Ala Lys Val Thr Gly Ile Ile Lys  
 420 425 430  
  
 ttt gat ctg cat gca gaa gct gag aca ggg aaa aga atg ctg gaa gta 1344  
 Phe Asp Leu His Ala Glu Ala Glu Thr Gly Lys Arg Met Leu Glu Val  
 435 440 445  
  
 gga ggt aat atc aaa gga ata tat gac ctg gga gaa ggc aga tat ggt 1392  
 Gly Gly Asn Ile Lys Gly Ile Tyr Asp Leu Gly Glu Gly Arg Tyr Gly  
 450 455 460  
  
 tca gag gct atc tat gtt ccg cgt gag aca gca gaa gaa gac gac ggt 1440  
 Ser Glu Ala Ile Tyr Val Pro Arg Glu Thr Ala Glu Glu Asp Asp Gly  
 465 470 475 480  
  
 tac ttg ata ttc ttt gtt cat gat gaa aac aca ggg aaa tca tgc gtg 1488  
 Tyr Leu Ile Phe Phe Val His Asp Glu Asn Thr Gly Lys Ser Cys Val  
 485 490 495  
  
 act gtg ata gac gca aaa aca atg tcg gct gaa ccg gtg gca gtg gtg 1536  
 Thr Val Ile Asp Ala Lys Thr Met Ser Ala Glu Pro Val Ala Val Val  
 500 505 510  
  
 gag ctg ccg cac agg gtc cca tat ggc ttc cat gcc ttg ttt gtt aca 1584  
 Glu Leu Pro His Arg Val Pro Tyr Gly Phe His Ala Leu Phe Val Thr  
 515 520 525  
  
 gag gaa caa ctc cag gaa caa act ctt ata taa 1617  
 Glu Glu Gln Leu Gln Glu Gln Thr Leu Ile  
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&lt;211&gt; 538

&lt;212&gt; PRT

&lt;213&gt; Arabidopsis thaliana

&lt;400&gt; 8

Met Ala Glu Lys Leu Ser Asp Gly Ser Ser Ile Ile Ser Val His Pro  
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Leu	Val	Val	Lys	Leu	Met	His	Asp	Ala	Ser	Leu	Pro	Leu	His	Tyr	Leu	35	40	45
Ser	Gly	Asn	Phe	Ala	Pro	Ile	Arg	Asp	Glu	Thr	Pro	Pro	Val	Lys	Asp	50	55	60
Leu	Pro	Val	His	Gly	Phe	Leu	Pro	Glu	Cys	Leu	Asn	Gly	Glu	Phe	Val	65	70	75
Arg	Val	Gly	Pro	Asn	Pro	Lys	Phe	Asp	Ala	Val	Ala	Gly	Tyr	His	Trp	85	90	95
Phe	Asp	Gly	Asp	Gly	Met	Ile	His	Gly	Val	Arg	Ile	Lys	Asp	Gly	Lys	100	105	110
Ala	Thr	Tyr	Val	Ser	Arg	Tyr	Val	Lys	Thr	Ser	Arg	Leu	Lys	Gln	Glu	115	120	125
Glu	Phe	Phe	Gly	Ala	Ala	Lys	Phe	Met	Lys	Ile	Gly	Asp	Leu	Lys	Gly	130	135	140
Phe	Phe	Gly	Leu	Leu	Met	Val	Asn	Val	Gln	Gln	Leu	Arg	Thr	Lys	Leu	145	150	155
Lys	Ile	Leu	Asp	Asn	Thr	Tyr	Gly	Asn	Gly	Thr	Ala	Asn	Thr	Ala	Leu	165	170	175
Val	Tyr	His	His	Gly	Lys	Leu	Leu	Ala	Leu	Gln	Glu	Ala	Asp	Lys	Pro	180	185	190
Tyr	Val	Ile	Lys	Val	Leu	Glu	Asp	Gly	Asp	Leu	Gln	Thr	Leu	Gly	Ile	195	200	205
Ile	Asp	Tyr	Asp	Lys	Arg	Leu	Thr	His	Ser	Phe	Thr	Ala	His	Pro	Lys	210	215	220
Val	Asp	Pro	Val	Thr	Gly	Glu	Met	Phe	Thr	Phe	Gly	Tyr	Ser	His	Thr	225	230	235
Pro	Pro	Tyr	Leu	Thr	Tyr	Arg	Val	Ile	Ser	Lys	Asp	Gly	Ile	Met	His	245	250	255
Asp	Pro	Val	Pro	Ile	Thr	Ile	Ser	Glu	Pro	Ile	Met	Met	His	Asp	Phe	260	265	270
Ala	Ile	Thr	Glu	Thr	Tyr	Ala	Ile	Phe	Met	Asp	Leu	Pro	Met	His	Phe	275	280	285
Arg	Pro	Lys	Glu	Met	Val	Lys	Glu	Lys	Lys	Met	Ile	Tyr	Ser	Phe	Asp	290	295	300
Pro	Thr	Lys	Lys	Ala	Arg	Phe	Gly	Val	Leu	Pro	Arg	Tyr	Ala	Lys	Asp	305	310	315
																		320

Glu Leu Met Ile Arg Trp Phe Glu Leu Pro Asn Cys Phe Ile Phe His  
325 330 335

Asn Ala Asn Ala Trp Glu Glu Glu Asp Glu Val Val Leu Ile Thr Cys  
340 345 350

Arg Leu Glu Asn Pro Asp Leu Asp Met Val Ser Gly Lys Val Lys Glu  
355 360 365

Lys Leu Glu Asn Phe Gly Asn Glu Leu Tyr Glu Met Arg Phe Asn Met  
370 375 380

Lys Thr Gly Ser Ala Ser Gln Lys Lys Leu Ser Ala Ser Ala Val Asp  
385 390 395 400

Phe Pro Arg Ile Asn Glu Cys Tyr Thr Gly Lys Lys Gln Arg Tyr Val  
405 410 415

Tyr Gly Thr Ile Leu Asp Ser Ile Ala Lys Val Thr Gly Ile Ile Lys  
420 425 430

Phe Asp Leu His Ala Glu Ala Glu Thr Gly Lys Arg Met Leu Glu Val  
435 440 445

Gly Gly Asn Ile Lys Gly Ile Tyr Asp Leu Gly Glu Gly Arg Tyr Gly  
450 455 460

Ser Glu Ala Ile Tyr Val Pro Arg Glu Thr Ala Glu Glu Asp Asp Gly  
465 470 475 480

Tyr Leu Ile Phe Phe Val His Asp Glu Asn Thr Gly Lys Ser Cys Val  
485 490 495

Thr Val Ile Asp Ala Lys Thr Met Ser Ala Glu Pro Val Ala Val Val  
500 505 510

Glu Leu Pro His Arg Val Pro Tyr Gly Phe His Ala Leu Phe Val Thr  
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Glu Glu Gln Leu Gln Glu Gln Thr Leu Ile  
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<211> 1734

<212> DNA

<213> Arabidopsis thaliana

<220>

<221> CDS

<222> (1)..(1731)

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Arg Ser His Leu Leu Pro Gln Pro Lys Asn Ala Asn Ile Ser Arg Arg	
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att ctc att aac cct ttc aag ata ccg aca ctt cct gat ctc act tct	144
Ile Leu Ile Asn Pro Phe Lys Ile Pro Thr Leu Pro Asp Leu Thr Ser	
35 40 45	
ccg gtt ccg tca ccg gtt aag ctc aaa cca acg tat cca aac tta aac	192
Pro Val Pro Ser Pro Val Lys Leu Lys Pro Thr Tyr Pro Asn Leu Asn	
50 55 60	
ctt ctt cag aag cta gcg gct acg atg ctc gac aag att gag tcc tct	240
Leu Leu Gln Lys Leu Ala Ala Thr Met Leu Asp Lys Ile Glu Ser Ser	
65 70 75 80	
atc gtt att cct atg gag cag aat cgc ccg ctt cct aaa ccg acc gac	288
Ile Val Ile Pro Met Glu Gln Asn Arg Pro Leu Pro Lys Pro Thr Asp	
85 90 95	
ccg gcg gtt caa tta tca ggt aac ttc gct ccg gtt aat gaa tgt ccg	336
Pro Ala Val Gln Leu Ser Gly Asn Phe Ala Pro Val Asn Glu Cys Pro	
100 105 110	
gtt cag aac ggt tta gaa gtg gtt ggt cag att cct tct tgt cta aaa	384
Val Gln Asn Gly Leu Glu Val Val Gly Gln Ile Pro Ser Cys Leu Lys	
115 120 125	
gga gtt tac atc cgt aac ggt gca aac cct atg ttt ccg ccg tta gcc	432
Gly Val Tyr Ile Arg Asn Gly Ala Asn Pro Met Phe Pro Pro Leu Ala	
130 135 140	
gga cat cat tta ttt gac ggt gac gga atg att cac gcc gtt agt atc	480
Gly His His Leu Phe Asp Gly Asp Gly Met Ile His Ala Val Ser Ile	
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Gly Phe Asp Asn Gln Val Ser Tyr Ser Cys Arg Tyr Thr Lys Thr Asn	
165 170 175	
cgg ctt gtt caa gaa acc gcg ctt gga cga tcg gtt ttc cct aaa cca	576
Arg Leu Val Gln Glu Thr Ala Leu Gly Arg Ser Val Phe Pro Lys Pro	
180 185 190	
atc ggc gag ctt cac ggc cat tcc ggt cta gct cga ctc gct ctc ttc	624
Ile Gly Glu Leu His Gly His Ser Gly Leu Ala Arg Leu Ala Leu Phe	
195 200 205	
acg gct cga gct ggg atc ggt cta gtg gac ggg aca cgt ggc atg ggc	672
Thr Ala Arg Ala Gly Ile Gly Leu Val Asp Gly Thr Arg Gly Met Gly	
210 215 220	
gta gct aac gcc ggt gtg gtt ttc ttt aac ggc agg tta tta gcc atg	720
Val Ala Asn Ala Gly Val Val Phe Phe Asn Gly Arg Leu Leu Ala Met	
225 230 235 240	

tca gaa gat gat ctt cct tac caa gtg aag atc gac ggt caa gga gat	768
Ser Glu Asp Asp Leu Pro Tyr Gln Val Lys Ile Asp Gly Gln Gly Asp	
245 250 255	
ctt gag acg atc gga cgg ttc gga ttc gat gac cag att gac tct tca	816
Leu Glu Thr Ile Gly Arg Phe Gly Phe Asp Asp Gln Ile Asp Ser Ser	
260 265 270	
gtg ata gcg cat cct aag gtg gac gcg acc aca gga gat ctc cat aca	864
Val Ile Ala His Pro Lys Val Asp Ala Thr Thr Gly Asp Leu His Thr	
275 280 285	
ctg agc tac aac gtt ttg aag aaa cct cat ctc agg tat ctt aaa ttc	912
Leu Ser Tyr Asn Val Leu Lys Lys Pro His Leu Arg Tyr Leu Lys Phe	
290 295 300	
aac acg tgc ggg aaa aag aca cgt gac gtg gag atc acg ctc cct gaa	960
Asn Thr Cys Gly Lys Lys Thr Arg Asp Val Glu Ile Thr Leu Pro Glu	
305 310 315 320	
cca acg atg att cat gat ttc gcg ata acc gag aat ttt gtc gtt ata	1008
Pro Thr Met Ile His Asp Phe Ala Ile Thr Glu Asn Phe Val Val Ile	
325 330 335	
ccg gat cag caa atg gta ttc aaa tta tcc gaa atg att cgg ggc ggg	1056
Pro Asp Gln Gln Met Val Phe Lys Leu Ser Glu Met Ile Arg Gly Gly	
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tca ccc gtt atc tac gtt aaa gaa aaa atg gcg aga ttt gga gtt ttg	1104
Ser Pro Val Ile Tyr Val Lys Glu Lys Met Ala Arg Phe Gly Val Leu	
355 360 365	
tca aag cag gat ctg acc ggg tcg gat ata aat tgg gtt gat gta ccg	1152
Ser Lys Gln Asp Leu Thr Gly Ser Asp Ile Asn Trp Val Asp Val Pro	
370 375 380	
gat tgt ttc tgt ttc cat cta tgg aat gcg tgg gaa gag aga acc gaa	1200
Asp Cys Phe Cys Phe His Leu Trp Asn Ala Trp Glu Glu Arg Thr Glu	
385 390 395 400	
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Glu Gly Asp Pro Val Ile Val Val Ile Gly Ser Cys Met Ser Pro Pro	
405 410 415	
gac acg atc ttt agt gaa tca gga gaa cca acc cgg gtt gaa tta agt	1296
Asp Thr Ile Phe Ser Glu Ser Gly Glu Pro Thr Arg Val Glu Leu Ser	
420 425 430	
gag atc cgg tta aac atg cgt aca aaa gaa tcg aac cgt aag gtt atc	1344
Glu Ile Arg Leu Asn Met Arg Thr Lys Glu Ser Asn Arg Lys Val Ile	
435 440 445	
gta acc gga gtg aat tta gaa gcg ggt cac ata aac cgt agt tac gtg	1392
Val Thr Gly Val Asn Leu Glu Ala Gly His Ile Asn Arg Ser Tyr Val	
450 455 460	



ggc cgg aaa agc cag ttc gtt tac ata gca ata gcc gat cct tgg ccc 1440  
 Gly Arg Lys Ser Gln Phe Val Tyr Ile Ala Ile Ala Asp Pro Trp Pro  
 465 470 475 480

aaa tgc agt ggc att gcg aag gta gat ata caa aac ggc acc gtt tca 1488  
 Lys Cys Ser Gly Ile Ala Lys Val Asp Ile Gln Asn Gly Thr Val Ser  
 485 490 495

gag ttt aat tac gga ccg agc cgg ttc ggt gga gaa ccg tgc ttt gta 1536  
 Glu Phe Asn Tyr Gly Pro Ser Arg Phe Gly Gly Glu Pro Cys Phe Val  
 500 505 510

ccg gag gga gaa gga gaa gaa gac aaa ggt tat gta atg ggg ttt gtg 1584  
 Pro Glu Gly Glu Gly Glu Glu Asp Lys Gly Tyr Val Met Gly Phe Val  
 515 520 525

aga gac gaa gag aaa gac gag tcg gag ttt gtg gtg gtc gac gcg acg 1632  
 Arg Asp Glu Glu Lys Asp Glu Ser Glu Phe Val Val Val Asp Ala Thr  
 530 535 540

gat atg aag caa gtc gcg gcg gtg cgc ttg ccg gag agg gta cct tat 1680  
 Asp Met Lys Gln Val Ala Ala Val Arg Leu Pro Glu Arg Val Pro Tyr  
 545 550 555 560

ggt ttc cat gga acg ttc gtg agc gag aat cag ttg aag gaa caa gtt 1728  
 Gly Phe His Gly Thr Phe Val Ser Glu Asn Gln Leu Lys Glu Gln Val  
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<211> 577

<212> PRT

<213> Arabidopsis thaliana

<400> 10

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Ile Leu Ile Asn Pro Phe Lys Ile Pro Thr Leu Pro Asp Leu Thr Ser  
 35 40 45

Pro Val Pro Ser Pro Val Lys Leu Lys Pro Thr Tyr Pro Asn Leu Asn  
 50 55 60

Leu Leu Gln Lys Leu Ala Ala Thr Met Leu Asp Lys Ile Glu Ser Ser  
 65 70 75 80

Ile Val Ile Pro Met Glu Gln Asn Arg Pro Leu Pro Lys Pro Thr Asp  
 85 90 95

Pro Ala Val Gln Leu Ser Gly Asn Phe Ala Pro Val Asn Glu Cys Pro  
 100 105 110

Val	Gln	Asn	Gly	Leu	Glu	Val	Val	Gly	Gln	Ile	Pro	Ser	Cys	Leu	Lys	115	120	125
Gly	Val	Tyr	Ile	Arg	Asn	Gly	Ala	Asn	Pro	Met	Phe	Pro	Pro	Leu	Ala	130	135	140
Gly	His	His	Leu	Phe	Asp	Gly	Asp	Gly	Met	Ile	His	Ala	Val	Ser	Ile	145	150	155
Gly	Phe	Asp	Asn	Gln	Val	Ser	Tyr	Ser	Cys	Arg	Tyr	Thr	Lys	Thr	Asn	165	170	175
Arg	Leu	Val	Gln	Glu	Thr	Ala	Leu	Gly	Arg	Ser	Val	Phe	Pro	Lys	Pro	180	185	190
Ile	Gly	Glu	Leu	His	Gly	His	Ser	Gly	Leu	Ala	Arg	Leu	Ala	Leu	Phe	195	200	205
Thr	Ala	Arg	Ala	Gly	Ile	Gly	Leu	Val	Asp	Gly	Thr	Arg	Gly	Met	Gly	210	215	220
Val	Ala	Asn	Ala	Gly	Val	Val	Phe	Phe	Asn	Gly	Arg	Leu	Leu	Ala	Met	225	230	235
Ser	Glu	Asp	Asp	Leu	Pro	Tyr	Gln	Val	Lys	Ile	Asp	Gly	Gln	Gly	Asp	245	250	255
Leu	Glu	Thr	Ile	Gly	Arg	Phe	Gly	Phe	Asp	Asp	Gln	Ile	Asp	Ser	Ser	260	265	270
Val	Ile	Ala	His	Pro	Lys	Val	Asp	Ala	Thr	Thr	Gly	Asp	Leu	His	Thr	275	280	285
Leu	Ser	Tyr	Asn	Val	Leu	Lys	Lys	Pro	His	Leu	Arg	Tyr	Leu	Lys	Phe	290	295	300
Asn	Thr	Cys	Gly	Lys	Lys	Thr	Arg	Asp	Val	Glu	Ile	Thr	Leu	Pro	Glu	305	310	315
Pro	Thr	Met	Ile	His	Asp	Phe	Ala	Ile	Thr	Glu	Asn	Phe	Val	Val	Ile	325	330	335
Pro	Asp	Gln	Gln	Met	Val	Phe	Lys	Leu	Ser	Glu	Met	Ile	Arg	Gly	Gly	340	345	350
Ser	Pro	Val	Ile	Tyr	Val	Lys	Glu	Lys	Met	Ala	Arg	Phe	Gly	Val	Leu	355	360	365
Ser	Lys	Gln	Asp	Leu	Thr	Gly	Ser	Asp	Ile	Asn	Trp	Val	Asp	Val	Pro	370	375	380
Asp	Cys	Phe	Cys	Phe	His	Leu	Trp	Asn	Ala	Trp	Glu	Glu	Arg	Thr	Glu	385	390	395
Glu	Gly	Asp	Pro	Val	Ile	Val	Val	Ile	Gly	Ser	Cys	Met	Ser	Pro	Pro	405	410	415

Asp Thr Ile Phe Ser Glu Ser Gly Glu Pro Thr Arg Val Glu Leu Ser  
 420 425 430

Glu Ile Arg Leu Asn Met Arg Thr Lys Glu Ser Asn Arg Lys Val Ile  
 435 440 445

Val Thr Gly Val Asn Leu Glu Ala Gly His Ile Asn Arg Ser Tyr Val  
 450 455 460

Gly Arg Lys Ser Gln Phe Val Tyr Ile Ala Ile Ala Asp Pro Trp Pro  
 465 470 475 480

Lys Cys Ser Gly Ile Ala Lys Val Asp Ile Gln Asn Gly Thr Val Ser  
 485 490 495

Glu Phe Asn Tyr Gly Pro Ser Arg Phe Gly Gly Glu Pro Cys Phe Val  
 500 505 510

Pro Glu Gly Glu Gly Glu Glu Asp Lys Gly Tyr Val Met Gly Phe Val  
 515 520 525

Arg Asp Glu Glu Lys Asp Glu Ser Glu Phe Val Val Val Asp Ala Thr  
 530 535 540

Asp Met Lys Gln Val Ala Ala Val Arg Leu Pro Glu Arg Val Pro Tyr  
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Gly Phe His Gly Thr Phe Val Ser Glu Asn Gln Leu Lys Glu Gln Val  
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Phe

<210> 11

<211> 1839

<212> DNA

<213> Vigna unguiculata

<220>

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<222> (1)..(1836)

<400> 11

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ccc ccc ttc aaa gac cta cct tcc aca tct tct ccc aca aac tta ctt 96  
 Pro Pro Phe Lys Asp Leu Pro Ser Thr Ser Ser Pro Thr Asn Leu Leu  
 20 25 30

cct tta agg aaa aca tcc tct tcc aac acc atc aca tgt tcc ctt caa 144  
 Pro Leu Arg Lys Thr Ser Ser Ser Asn Thr Ile Thr Cys Ser Leu Gln  
 35 40 45

aca ctc cac ttc ccc aaa cag tac caa cca aca tcc aca tcc aca tcc 192  
 Thr Leu His Phe Pro Lys Gln Tyr Gln Pro Thr Ser Thr Ser Thr Ser  
 50 55 60

aca Thr 65	gcc Ala	acc Thr	acc Thr	aca Thr	aca Thr 70	ccc Pro	acc Thr	cca Pro	atc Ile	aaa Lys 75	act Thr	acc Thr	acc Thr	atc Ile	acc Thr 80	240
acc Thr	acc Thr	aca Thr	ccg Pro	ccc Pro 85	agg Arg	gaa Glu	acc Thr	aac Asn	cct Pro 90	ctc Leu	tct Ser	gac Asp	acc Thr	aac Asn 95	caa Gln	288
cca Pro	tta Leu	cct Pro	caa Gln 100	aaa Lys	tgg Trp	aac Asn	ttt Phe	ctc Leu 105	cag Gln	aaa Lys	gcc Ala	gct Ala	gcc Ala 110	acg Thr	gcc Ala	336
ttg Leu	gac Asp	ctg Leu 115	gtc Val	gaa Glu	acg Thr	gcg Ala	ctc Leu 120	gtc Val	tcg Ser	cac His	gag Glu	cgc Arg	aaa Lys 125	cac His	ccg Pro	384
ctc Leu 130	ccc Pro	aaa Lys	acg Thr	gcg Ala	gac Asp 135	ccg Pro	agg Arg	gtc Val	caa Gln	atc Ile	gcc Ala 140	ggg Ala Gly	aac Asn	ttc Phe	gcg Ala	432
ccg Pro 145	gtg Val	ccg Pro	gag Glu	cat His	gcc Ala 150	gcg Ala	gat Asp	caa Gln	gga Gly	ctc Leu 155	ccg Pro	gtg Val	gtc Val	gga Gly 160	aaa Lys	480
atc Ile	ccc Pro	aaa Lys	tgc Cys	att Ile 165	gac Asp	ggc Gly	gtg Val	tac Tyr	gtg Val 170	cgc Arg	aac Asn	ggt Gly	gcc Ala	aat Asn 175	ccg Pro	528
ctc Leu	tac Tyr	gag Glu	cct Pro 180	gtg Val	gcc Ala	ggg Gly	cac His	cac His	ttc Phe	ttc Phe	gac Asp	ggc Gly	gac Asp 190	ggc Gly	atg Met	576
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ttc Phe 210	acc Thr	gag Glu	acg Thr	cag Gln	cg Arg	ctc Leu 215	tcg Ser	cag Gln	gag Glu	aaa Lys	tct Ser 220	cta Leu	ggc Gly	cgc Arg	ccg Pro	672
gtg Val 225	ttc Phe	ccg Pro	aag Lys	gcc Ala	atc Ile 230	ggg Gly	gag Glu	ctc Leu	cac His	ggc Gly 235	cac His	tcc Ser	ggc Gly	atc Ile 240	gcg Ala	720
cgg Arg	ctc Leu	ctc Leu	ctc Leu	ttc Phe 245	tac Tyr	gcg Ala	cg Arg	ggt Gly	ctc Leu 250	ttc Phe	ggg Gly	ctc Leu	gtt Val	gat Asp 255	ggg Gly	768
tcc Ser	cag Gln	ggc Gly	atg Met 260	ggc Gly	gtg Val	gcg Ala	aac Asn	gcc Ala 265	ggt Gly	ctc Leu	gtc Val	tac Tyr	ttc Phe 270	aac Asn	aac Asn	816
cac His	ctc Leu	ttg Leu 275	gcc Ala	atg Met	tcc Ser	gaa Glu	gac Asp	gat Asp 280	tta Leu	ccc Pro	tac Tyr 285	cac His	gtg Val	aga Arg	atc Ile	864

acc cct aac ggc gac tta acc acc gtt ggc cgt tac gac ttc aac ggg	912
Thr Pro Asn Gly Asp Leu Thr Thr Val Gly Arg Tyr Asp Phe Asn Gly	
290 295 300	
cag ctc aac tca aca atg atc gcc cac ccg aaa ctg gac ccc gtc gac	960
Gln Leu Asn Ser Thr Met Ile Ala His Pro Lys Leu Asp Pro Val Asp	
305 310 315 320	
ggc gac ctc cac gcg ctc agc tac gac gtc att cag aag cct tac ctc	1008
Gly Asp Leu His Ala Leu Ser Tyr Asp Val Ile Gln Lys Pro Tyr Leu	
325 330 335	
aag tac ttc cgt ttc tcc ccc gac ggc gtc aag tcc ccc gac gtg gaa	1056
Lys Tyr Phe Arg Phe Ser Pro Asp Gly Val Lys Ser Pro Asp Val Glu	
340 345 350	
atc ccc ctg aag gag ccc acc atg atg cac gat ttc gcc ata acg gag	1104
Ile Pro Leu Lys Glu Pro Thr Met Met His Asp Phe Ala Ile Thr Glu	
355 360 365	
aat ttc gtc gtc gtc ccc gac cag cag gtg gtc ttc aaa cta acg gag	1152
Asn Phe Val Val Val Pro Asp Gln Gln Val Val Phe Lys Leu Thr Glu	
370 375 380	
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Met Ile Thr Gly Gly Ser Pro Val Val Tyr Asp Lys Asn Lys Thr Ser	
385 390 395 400	
cgg ttt ggg att ctg cac aag aat gcg aag gac gcg aat gcg atg cgg	1248
Arg Phe Gly Ile Leu His Lys Asn Ala Lys Asp Ala Asn Ala Met Arg	
405 410 415	
tgg atc gac gcg ccg gat tgt ttc tgc ttc cac ctc tgg aac gcg tgg	1296
Trp Ile Asp Ala Pro Asp Cys Phe Cys Phe His Leu Trp Asn Ala Trp	
420 425 430	
gag gag ccc gaa acc gag gag gtt gtg gtg att ggg tcc tgc atg acc	1344
Glu Glu Pro Glu Thr Glu Glu Val Val Val Ile Gly Ser Cys Met Thr	
435 440 445	
cct gcg gac tcc att ttc aac gaa tgc gag gag agt ttg aag agc gtg	1392
Pro Ala Asp Ser Ile Phe Asn Glu Cys Glu Glu Ser Leu Lys Ser Val	
450 455 460	
ctg tca gag ata agg ctg aac ttg agg acc ggc aag tcc act cgg cgc	1440
Leu Ser Glu Ile Arg Leu Asn Leu Arg Thr Gly Lys Ser Thr Arg Arg	
465 470 475 480	
ccc att atc tcc gac gcc gaa caa gtg aac ctg gaa gcc ggc atg gtg	1488
Pro Ile Ile Ser Asp Ala Glu Gln Val Asn Leu Glu Ala Gly Met Val	
485 490 495	
aac aga aac aag ctc gga agg aag acc cag ttc gcg tat ctg gct ctg	1536
Asn Arg Asn Lys Leu Gly Arg Lys Thr Gln Phe Ala Tyr Leu Ala Leu	
500 505 510	

gcg	gag	ccc	tgg	ccc	aaa	gtc	tcg	ggc	ttt	gcg	aaa	gtt	gat	ttg	ctg	1584
Ala	Glu	Pro	Trp	Pro	Lys	Val	Ser	Gly	Phe	Ala	Lys	Val	Asp	Leu	Leu	
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agt	ggg	gaa	gtg	aag	aag	tac	atg	tat	gga	gaa	gag	aag	ttc	ggt	ggg	1632
Ser	Gly	Glu	Val	Lys	Lys	Tyr	Met	Tyr	Gly	Glu	Glu	Lys	Phe	Gly	Gly	
	530					535					540					
gag	cct	ctg	ttt	ctt	ccc	aac	ggc	caa	aaa	gaa	gac	gat	ggg	tat	att	1680
Glu	Pro	Leu	Phe	Leu	Pro	Asn	Gly	Gln	Lys	Glu	Asp	Asp	Gly	Tyr	Ile	
	545				550					555					560	
ctg	gca	ttc	gtg	cac	gac	gag	aaa	gaa	tgg	aaa	tcc	gag	ctg	cag	att	1728
Leu	Ala	Phe	Val	His	Asp	Glu	Lys	Glu	Trp	Lys	Ser	Glu	Leu	Gln	Ile	
				565				570						575		
gtg	aat	gcc	caa	aat	tta	aag	ctc	gaa	gct	tcc	atc	aaa	ctc	ccc	tct	1776
Val	Asn	Ala	Gln	Asn	Leu	Lys	Leu	Glu	Ala	Ser	Ile	Lys	Leu	Pro	Ser	
			580					585					590			
cgt	gtt	ccc	tac	ggg	ttt	cat	gga	act	ttc	att	cat	tcc	aag	gat	ttg	1824
Arg	Val	Pro	Tyr	Gly	Phe	His	Gly	Thr	Phe	Ile	His	Ser	Lys	Asp	Leu	
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agg	aaa	caa	gct	tga												1839
Arg	Lys	Gln	Ala													
	610															
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			20					25					30			
Pro	Leu	Arg	Lys	Thr	Ser	Ser	Ser	Asn	Thr	Ile	Thr	Cys	Ser	Leu	Gln	
		35					40					45				
Thr	Leu	His	Phe	Pro	Lys	Gln	Tyr	Gln	Pro	Thr	Ser	Thr	Ser	Thr	Ser	
	50					55					60					
Thr	Ala	Thr	Thr	Thr	Thr	Pro	Thr	Pro	Ile	Lys	Thr	Thr	Thr	Ile	Thr	
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Thr	Thr	Thr	Pro	Pro	Arg	Glu	Thr	Asn	Pro	Leu	Ser	Asp	Thr	Asn	Gln	
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Pro	Leu	Pro	Gln	Lys	Trp	Asn	Phe	Leu	Gln	Lys	Ala	Ala	Ala	Thr	Ala	
			100					105					110			
Leu	Asp	Leu	Val	Glu	Thr	Ala	Leu	Val	Ser	His	Glu	Arg	Lys	His	Pro	
	115						120					125				

Leu Pro Lys Thr Ala Asp Pro Arg Val Gln Ile Ala Gly Asn Phe Ala  
 130 135 140  
 Pro Val Pro Glu His Ala Ala Asp Gln Gly Leu Pro Val Val Gly Lys  
 145 150 155 160  
 Ile Pro Lys Cys Ile Asp Gly Val Tyr Val Arg Asn Gly Ala Asn Pro  
 165 170 175  
 Leu Tyr Glu Pro Val Ala Gly His His Phe Phe Asp Gly Asp Gly Met  
 180 185 190  
 Val His Ala Val Lys Phe Thr Asn Gly Ala Ala Ser Tyr Ala Cys Arg  
 195 200 205  
 Phe Thr Glu Thr Gln Arg Leu Ser Gln Glu Lys Ser Leu Gly Arg Pro  
 210 215 220  
 Val Phe Pro Lys Ala Ile Gly Glu Leu His Gly His Ser Gly Ile Ala  
 225 230 235 240  
 Arg Leu Leu Leu Phe Tyr Ala Arg Gly Leu Phe Gly Leu Val Asp Gly  
 245 250 255  
 Ser Gln Gly Met Gly Val Ala Asn Ala Gly Leu Val Tyr Phe Asn Asn  
 260 265 270  
 His Leu Leu Ala Met Ser Glu Asp Asp Leu Pro Tyr His Val Arg Ile  
 275 280 285  
 Thr Pro Asn Gly Asp Leu Thr Thr Val Gly Arg Tyr Asp Phe Asn Gly  
 290 295 300  
 Gln Leu Asn Ser Thr Met Ile Ala His Pro Lys Leu Asp Pro Val Asp  
 305 310 315 320  
 Gly Asp Leu His Ala Leu Ser Tyr Asp Val Ile Gln Lys Pro Tyr Leu  
 325 330 335  
 Lys Tyr Phe Arg Phe Ser Pro Asp Gly Val Lys Ser Pro Asp Val Glu  
 340 345 350  
 Ile Pro Leu Lys Glu Pro Thr Met Met His Asp Phe Ala Ile Thr Glu  
 355 360 365  
 Asn Phe Val Val Val Pro Asp Gln Gln Val Val Phe Lys Leu Thr Glu  
 370 375 380  
 Met Ile Thr Gly Gly Ser Pro Val Val Tyr Asp Lys Asn Lys Thr Ser  
 385 390 395 400  
 Arg Phe Gly Ile Leu His Lys Asn Ala Lys Asp Ala Asn Ala Met Arg  
 405 410 415  
 Trp Ile Asp Ala Pro Asp Cys Phe Cys Phe His Leu Trp Asn Ala Trp  
 420 425 430

Glu Glu Pro Glu Thr Glu Glu Val Val Val Ile Gly Ser Cys Met Thr  
435 440 445

Pro Ala Asp Ser Ile Phe Asn Glu Cys Glu Glu Ser Leu Lys Ser Val  
450 455 460

Leu Ser Glu Ile Arg Leu Asn Leu Arg Thr Gly Lys Ser Thr Arg Arg  
465 470 475 480

Pro Ile Ile Ser Asp Ala Glu Gln Val Asn Leu Glu Ala Gly Met Val  
485 490 495

Asn Arg Asn Lys Leu Gly Arg Lys Thr Gln Phe Ala Tyr Leu Ala Leu  
500 505 510

Ala Glu Pro Trp Pro Lys Val Ser Gly Phe Ala Lys Val Asp Leu Leu  
515 520 525

Ser Gly Glu Val Lys Lys Tyr Met Tyr Gly Glu Glu Lys Phe Gly Gly  
530 535 540

Glu Pro Leu Phe Leu Pro Asn Gly Gln Lys Glu Asp Asp Gly Tyr Ile  
545 550 555 560

Leu Ala Phe Val His Asp Glu Lys Glu Trp Lys Ser Glu Leu Gln Ile  
565 570 575

Val Asn Ala Gln Asn Leu Lys Leu Glu Ala Ser Ile Lys Leu Pro Ser  
580 585 590

Arg Val Pro Tyr Gly Phe His Gly Thr Phe Ile His Ser Lys Asp Leu  
595 600 605

Arg Lys Gln Ala  
610

<210> 13

<211> 1815

<212> DNA

<213> Zea mays

<220>

<221> CDS

<222> (1)..(1812)

<400> 13

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Met Gln Gly Leu Ala Pro Pro Thr Ser Val Ser Ile His Arg His Leu  
1 5 10 15

ccg gcc cgg tcc agg gcc cgg gcc tcc aat tcc gtc agg ttc tcg ccg 96  
Pro Ala Arg Ser Arg Ala Arg Ala Ser Asn Ser Val Arg Phe Ser Pro  
20 25 30

cgc gcc gtc agc tcc gtg ccg ccc gcc gag tgc ctc cag gcg ccg ttc 144  
Arg Ala Val Ser Ser Val Pro Pro Ala Glu Cys Leu Gln Ala Pro Phe  
35 40 45



cac aag ccc gtc gcc gac ctg cct gcg ccg tcc agg aag ccc gcc gcc	192
His Lys Pro Val Ala Asp Leu Pro Ala Pro Ser Arg Lys Pro Ala Ala	
50 55 60	
att gcc gtc cca ggg cac gcc gcg gcg ccg agg aaa gcg gag ggc ggc	240
Ile Ala Val Pro Gly His Ala Ala Ala Pro Arg Lys Ala Glu Gly Gly	
65 70 75 80	
aag aag cag ctc aac ttg ttc cag cgc gcc gcg gcg gcc gcg ctc gac	288
Lys Lys Gln Leu Asn Leu Phe Gln Arg Ala Ala Ala Ala Ala Leu Asp	
85 90 95	
gcg ttc gag gaa ggg ttc gtg gcc aac gtc ctc gag cgg ccc cac ggc	336
Ala Phe Glu Glu Gly Phe Val Ala Asn Val Leu Glu Arg Pro His Gly	
100 105 110	
ctg ccc agc acg gcc gac ccg gcc gtg cag atc gcc ggc aac ttc gcg	384
Leu Pro Ser Thr Ala Asp Pro Ala Val Gln Ile Ala Gly Asn Phe Ala	
115 120 125	
ccc gtc ggg gag agg ccg ccc gtg cac gag ctc ccc gtc tcc ggc cgc	432
Pro Val Gly Glu Arg Pro Pro Val His Glu Leu Pro Val Ser Gly Arg	
130 135 140	
atc ccg ccc ttc atc gac ggg gtc tac gcg cgc aac ggc gcc aac ccc	480
Ile Pro Pro Phe Ile Asp Gly Val Tyr Ala Arg Asn Gly Ala Asn Pro	
145 150 155 160	
tgc ttc gac ccc gtc gcg ggg cac cac ctc ttc gac ggc gac ggc atg	528
Cys Phe Asp Pro Val Ala Gly His His Leu Phe Asp Gly Asp Gly Met	
165 170 175	
gtg cac gcg ctg cgg ata cgc aac ggc gcc gcc gag tcc tac gcc tgc	576
Val His Ala Leu Arg Ile Arg Asn Gly Ala Ala Glu Ser Tyr Ala Cys	
180 185 190	
cgc ttc acg gag acc gcg cgc ctg cgc cag gag cgc gcg atc ggc cgc	624
Arg Phe Thr Glu Thr Ala Arg Leu Arg Gln Glu Arg Ala Ile Gly Arg	
195 200 205	
ccc gtc ttc ccc aag gcc att ggc gag ctg cac ggg cac tcc ggg atc	672
Pro Val Phe Pro Lys Ala Ile Gly Glu Leu His Gly His Ser Gly Ile	
210 215 220	
gcg cgc ctc gcc ctg ttc tac gcg cgc gcc gcg tgc ggc ctc gtg gac	720
Ala Arg Leu Ala Leu Phe Tyr Ala Arg Ala Ala Cys Gly Leu Val Asp	
225 230 235 240	
ccc tcg gcc ggc acc ggc gtg gcc aac gcc ggc ctc gtc tac ttc aac	768
Pro Ser Ala Gly Thr Gly Val Ala Asn Ala Gly Leu Val Tyr Phe Asn	
245 250 255	
ggc cgc ctg ctc gcc atg tcc gag gac gac ctc ccc tac cac gtc cgc	816
Gly Arg Leu Leu Ala Met Ser Glu Asp Asp Leu Pro Tyr His Val Arg	
260 265 270	

gtg gcg gac gac ggc gac ctc gag acc gtc ggc cgc tac gac ttc gac	864
Val Ala Asp Asp Gly Asp Leu Glu Thr Val Gly Arg Tyr Asp Phe Asp	
275 280 285	
ggg cag ctc ggc tgc gcc atg atc gcg cac ccc aag ctg gac ccg gcc	912
Gly Gln Leu Gly Cys Ala Met Ile Ala His Pro Lys Leu Asp Pro Ala	
290 295 300	
acc ggg gag ctc cac gcg ctc agc tac gac gtc atc aag agg ccg tac	960
Thr Gly Glu Leu His Ala Leu Ser Tyr Asp Val Ile Lys Arg Pro Tyr	
305 310 315 320	
ctc aag tac ttc tac ttc agg ccc gac ggc acc aag tcc gac gac gtg	1008
Leu Lys Tyr Phe Tyr Phe Arg Pro Asp Gly Thr Lys Ser Asp Asp Val	
325 330 335	
gag atc ccg ctg gag cag ccc acg atg atc cac gac ttc gcc atc acc	1056
Glu Ile Pro Leu Glu Gln Pro Thr Met Ile His Asp Phe Ala Ile Thr	
340 345 350	
gag aac ttc gtg gtt gtg ccc gac cac cag gtg gtg ttc aag ctc cag	1104
Glu Asn Phe Val Val Val Pro Asp His Gln Val Val Phe Lys Leu Gln	
355 360 365	
gag atg ctg cgc ggc ggg tcg ccc gtg gtg ctg gac aag gag aag acg	1152
Glu Met Leu Arg Gly Gly Ser Pro Val Val Leu Asp Lys Glu Lys Thr	
370 375 380	
tcg cgg ttc ggc gtg ctc ccc aag cac gcc gcg gac gcg tcg gag atg	1200
Ser Arg Phe Gly Val Leu Pro Lys His Ala Ala Asp Ala Ser Glu Met	
385 390 395 400	
gcg tgg gtg gac gtg ccg gac tgc ttc tgc ttc cac ctg tgg aac gcg	1248
Ala Trp Val Asp Val Pro Asp Cys Phe Cys Phe His Leu Trp Asn Ala	
405 410 415	
tgg gag gac gag gcg acg ggc gag gtg gtg gtg atc ggc tcc tgc atg	1296
Trp Glu Asp Glu Ala Thr Gly Glu Val Val Val Ile Gly Ser Cys Met	
420 425 430	
acc ccc gcc gac tcc atc ttc aac gag tcc gac gag cgc ctg gag agc	1344
Thr Pro Ala Asp Ser Ile Phe Asn Glu Ser Asp Glu Arg Leu Glu Ser	
435 440 445	
gtg ctg acc gag atc cgc ctg gac gcg cgc acg ggc cgg tcc acg cgc	1392
Val Leu Thr Glu Ile Arg Leu Asp Ala Arg Thr Gly Arg Ser Thr Arg	
450 455 460	
cgc gcc gtc ctg ccg ccg tcg cag cag gag aac ctg gag gtg ggc atg	1440
Arg Ala Val Leu Pro Pro Ser Gln Gln Glu Asn Leu Glu Val Gly Met	
465 470 475 480	
gtg aac cgc aac ctg ctg ggc cgc gag agc cgg tac gcg tac ctc gcg	1488
Val Asn Arg Asn Leu Leu Gly Arg Glu Ser Arg Tyr Ala Tyr Leu Ala	
485 490 495	

gtg gcg gag ccg tgg ccc aag gag tcg ggc ttc gcc aag gag gac ctg 1536  
 Val Ala Glu Pro Trp Pro Lys Glu Ser Gly Phe Ala Lys Glu Asp Leu  
                   500                                  505                                  510

tcc acg ggc gag ctc acc aag ttc gag tac ggc gag ggc cgg ttc ggc 1584  
 Ser Thr Gly Glu Leu Thr Lys Phe Glu Tyr Gly Glu Gly Arg Phe Gly  
                   515                                  520                                  525

ggc gag ccc tgc ttc gtt ccc atg gac ccg gcc gcg gcc cac ccg cgc 1632  
 Gly Glu Pro Cys Phe Val Pro Met Asp Pro Ala Ala Ala His Pro Arg  
                   530                                  535                                  540

ggc gag gac gac ggg tac gtg ctc acc ttc gtc cac gac gag cgc gcc 1680  
 Gly Glu Asp Asp Gly Tyr Val Leu Thr Phe Val His Asp Glu Arg Ala  
                   545                                  550                                  555                                  560

ggc acg tcg gag cta ctt gtg gtc aat gcc gcc gac atc cgg ctg gag 1728  
 Gly Thr Ser Glu Leu Leu Val Val Asn Ala Ala Asp Ile Arg Leu Glu  
                                   565                                  570                                  575

gcc acg gtt cag ctg ccg tcc cgc gtg ccc ttc ggc ttc cac ggc acc 1776  
 Ala Thr Val Gln Leu Pro Ser Arg Val Pro Phe Gly Phe His Gly Thr  
                                   580                                  585                                  590

ttc atc acg ggc cag gag ctc gag gcc cag gcg gcc tga 1815  
 Phe Ile Thr Gly Gln Glu Leu Glu Ala Gln Ala Ala  
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<210> 14

<211> 604

<212> PRT

<213> Zea mays

<400> 14

Met Gln Gly Leu Ala Pro Pro Thr Ser Val Ser Ile His Arg His Leu  
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                   20                                  25                                  30

Arg Ala Val Ser Ser Val Pro Pro Ala Glu Cys Leu Gln Ala Pro Phe  
                   35                                  40                                  45

His Lys Pro Val Ala Asp Leu Pro Ala Pro Ser Arg Lys Pro Ala Ala  
                   50                                  55                                  60

Ile Ala Val Pro Gly His Ala Ala Ala Pro Arg Lys Ala Glu Gly Gly  
                   65                                  70                                  75                                  80

Lys Lys Gln Leu Asn Leu Phe Gln Arg Ala Ala Ala Ala Ala Leu Asp  
                                   85                                  90                                  95

Ala Phe Glu Glu Gly Phe Val Ala Asn Val Leu Glu Arg Pro His Gly  
                   100                                  105                                  110

Leu Pro Ser Thr Ala Asp Pro Ala Val Gln Ile Ala Gly Asn Phe Ala  
                   115                                  120                                  125

Pro Val Gly Glu Arg Pro Pro Val His Glu Leu Pro Val Ser Gly Arg  
 130 135 140  
 Ile Pro Pro Phe Ile Asp Gly Val Tyr Ala Arg Asn Gly Ala Asn Pro  
 145 150 155 160  
 Cys Phe Asp Pro Val Ala Gly His His Leu Phe Asp Gly Asp Gly Met  
 165 170 175  
 Val His Ala Leu Arg Ile Arg Asn Gly Ala Ala Glu Ser Tyr Ala Cys  
 180 185 190  
 Arg Phe Thr Glu Thr Ala Arg Leu Arg Gln Glu Arg Ala Ile Gly Arg  
 195 200 205  
 Pro Val Phe Pro Lys Ala Ile Gly Glu Leu His Gly His Ser Gly Ile  
 210 215 220  
 Ala Arg Leu Ala Leu Phe Tyr Ala Arg Ala Ala Cys Gly Leu Val Asp  
 225 230 235 240  
 Pro Ser Ala Gly Thr Gly Val Ala Asn Ala Gly Leu Val Tyr Phe Asn  
 245 250 255  
 Gly Arg Leu Leu Ala Met Ser Glu Asp Asp Leu Pro Tyr His Val Arg  
 260 265 270  
 Val Ala Asp Asp Gly Asp Leu Glu Thr Val Gly Arg Tyr Asp Phe Asp  
 275 280 285  
 Gly Gln Leu Gly Cys Ala Met Ile Ala His Pro Lys Leu Asp Pro Ala  
 290 295 300  
 Thr Gly Glu Leu His Ala Leu Ser Tyr Asp Val Ile Lys Arg Pro Tyr  
 305 310 315 320  
 Leu Lys Tyr Phe Tyr Phe Arg Pro Asp Gly Thr Lys Ser Asp Asp Val  
 325 330 335  
 Glu Ile Pro Leu Glu Gln Pro Thr Met Ile His Asp Phe Ala Ile Thr  
 340 345 350  
 Glu Asn Phe Val Val Val Pro Asp His Gln Val Val Phe Lys Leu Gln  
 355 360 365  
 Glu Met Leu Arg Gly Gly Ser Pro Val Val Leu Asp Lys Glu Lys Thr  
 370 375 380  
 Ser Arg Phe Gly Val Leu Pro Lys His Ala Ala Asp Ala Ser Glu Met  
 385 390 395 400  
 Ala Trp Val Asp Val Pro Asp Cys Phe Cys Phe His Leu Trp Asn Ala  
 405 410 415  
 Trp Glu Asp Glu Ala Thr Gly Glu Val Val Val Ile Gly Ser Cys Met  
 420 425 430

Thr Pro Ala Asp Ser Ile Phe Asn Glu Ser Asp Glu Arg Leu Glu Ser  
435 440 445

Val Leu Thr Glu Ile Arg Leu Asp Ala Arg Thr Gly Arg Ser Thr Arg  
450 455 460

Arg Ala Val Leu Pro Pro Ser Gln Gln Glu Asn Leu Glu Val Gly Met  
465 470 475 480

Val Asn Arg Asn Leu Leu Gly Arg Glu Ser Arg Tyr Ala Tyr Leu Ala  
485 490 495

Val Ala Glu Pro Trp Pro Lys Glu Ser Gly Phe Ala Lys Glu Asp Leu  
500 505 510

Ser Thr Gly Glu Leu Thr Lys Phe Glu Tyr Gly Glu Gly Arg Phe Gly  
515 520 525

Gly Glu Pro Cys Phe Val Pro Met Asp Pro Ala Ala Ala His Pro Arg  
530 535 540

Gly Glu Asp Asp Gly Tyr Val Leu Thr Phe Val His Asp Glu Arg Ala  
545 550 555 560

Gly Thr Ser Glu Leu Leu Val Val Asn Ala Ala Asp Ile Arg Leu Glu  
565 570 575

Ala Thr Val Gln Leu Pro Ser Arg Val Pro Phe Gly Phe His Gly Thr  
580 585 590

Phe Ile Thr Gly Gln Glu Leu Glu Ala Gln Ala Ala  
595 600

<210> 15

<211> 1818

<212> DNA

<213> Lycopersicon esculentum

<220>

<221> CDS

<222> (1)..(1815)

<400> 15

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1 5 10 15

ttg tca atg cca tca tca aag gag ttt ggt ttt gca tca aac tct att 96  
Leu Ser Met Pro Ser Ser Lys Glu Phe Gly Phe Ala Ser Asn Ser Ile  
20 25 30

tct cta ctc aaa aat caa cat aat agg caa agt ctc aac att aat tcc 144  
Ser Leu Leu Lys Asn Gln His Asn Arg Gln Ser Leu Asn Ile Asn Ser  
35 40 45

tct ctt caa gct cca cct ata ctt cat ttt cct aaa caa tct tca aat	192
Ser Leu Gln Ala Pro Pro Ile Leu His Phe Pro Lys Gln Ser Ser Asn	
50 55 60	
tat caa aca cca aag aat aat aca att tca cac cca aaa caa gaa aac	240
Tyr Gln Thr Pro Lys Asn Asn Thr Ile Ser His Pro Lys Gln Glu Asn	
65 70 75 80	
aac aac tcc tct tct tct tca act tcc aag tgg aat tta gtg cag aaa	288
Asn Asn Ser Ser Ser Ser Ser Thr Ser Lys Trp Asn Leu Val Gln Lys	
85 90 95	
gca gca gca atg gct tta gat gct gta gaa agt gct tta act aaa cat	336
Ala Ala Ala Met Ala Leu Asp Ala Val Glu Ser Ala Leu Thr Lys His	
100 105 110	
gaa ctt gaa cac cct ttg ccg aaa aca gcc gac cca cga gtc cag att	384
Glu Leu Glu His Pro Leu Pro Lys Thr Ala Asp Pro Arg Val Gln Ile	
115 120 125	
tct ggg aat ttt gct ccg gta ccg gaa aat cca gtc tgt caa tct ctt	432
Ser Gly Asn Phe Ala Pro Val Pro Glu Asn Pro Val Cys Gln Ser Leu	
130 135 140	
ccg gtc acc gga aaa ata ccc aaa tgt gtt caa ggc gtt tac gtt cga	480
Pro Val Thr Gly Lys Ile Pro Lys Cys Val Gln Gly Val Tyr Val Arg	
145 150 155 160	
aac gga gct aac cct ctt ttt gaa cca acc gcc gga cac cat ttc ttc	528
Asn Gly Ala Asn Pro Leu Phe Glu Pro Thr Ala Gly His His Phe Phe	
165 170 175	
gac ggc gac ggt atg gtt cac gcc gtt caa ttc aaa aat ggg tcg gct	576
Asp Gly Asp Gly Met Val His Ala Val Gln Phe Lys Asn Gly Ser Ala	
180 185 190	
agt tac gct tgc cgt ttc act gaa aca gag agg ctt gtt caa gaa aaa	624
Ser Tyr Ala Cys Arg Phe Thr Glu Thr Glu Arg Leu Val Gln Glu Lys	
195 200 205	
gct ttg ggt cgc cct gtt ttc cct aaa gcc att ggt gaa tta cat ggt	672
Ala Leu Gly Arg Pro Val Phe Pro Lys Ala Ile Gly Glu Leu His Gly	
210 215 220	
cac tct gga att gca agg ctt atg ctg ttt tac gct cgt ggg ctc ttc	720
His Ser Gly Ile Ala Arg Leu Met Leu Phe Tyr Ala Arg Gly Leu Phe	
225 230 235 240	
gga ctt gtt gat cac agt aaa gga act ggt gtt gca aac gcc ggt tta	768
Gly Leu Val Asp His Ser Lys Gly Thr Gly Val Ala Asn Ala Gly Leu	
245 250 255	
gtc tat ttc aat aac cga tta ctt gct atg tct gaa gat gat ttg cct	816
Val Tyr Phe Asn Asn Arg Leu Leu Ala Met Ser Glu Asp Asp Leu Pro	
260 265 270	

tac Tyr	cat His	gta Val 275	aag Lys	gta Val	aca Thr	ccc Pro	acc Thr	ggc Gly	gat Asp	ctt Leu	aaa Lys	aca Thr 285	gag Glu	ggt Gly	cga Arg	864
ttc Phe	gat Asp 290	ttc Phe	gac Asp	ggc Gly	cag Gln	cta Leu 295	aaa Lys	tcc Ser	acc Thr	atg Met	ata Ile 300	gct Ala	cac His	cca Pro	aag Lys	912
ctc Leu 305	gac Asp	cca Pro	gtt Val	tcc Ser	ggg Gly 310	gag Glu	cta Leu	ttt Phe	gct Ala	ctt Leu 315	agc Ser	tac Tyr	gat Asp	gtg Val	att Ile 320	960
cag Gln	aag Lys	cca Pro	tac Tyr	ctc Leu 325	aag Lys	tac Tyr	ttc Phe	aga Arg	ttt Phe 330	tca Ser	aaa Lys	aat Asn	ggg Gly	gaa Glu 335	aaa Lys	1008
tca Ser	aat Asn	gat Asp	gtt Val 340	gaa Glu	att Ile	cca Pro	gtt Val	gaa Glu 345	gac Asp	cca Pro	aca Thr	atg Met 350	atg Met	cat His	gat Asp	1056
ttc Phe	gca Ala 355	att Ile	act Thr	gag Glu	aac Asn	ttc Phe	gtc Val 360	gtc Val	att Ile	cct Pro	gat Asp	caa Gln 365	caa Gln	gtc Val	gtt Val	1104
ttc Phe	aag Lys 370	atg Met	tct Ser	gaa Glu	atg Met	atc Ile 375	cgt Arg	gga Gly	ggg Gly	tca Ser	ccg Pro 380	gtg Val	gtt Val	tac Tyr	gac Asp	1152
aag Lys 385	aac Asn	aaa Lys	gtt Val	tcc Ser	cga Arg 390	ttt Phe	ggg Gly	att Ile	ctg Leu	gat Asp 395	aag Lys	tac Tyr	gcg Ala	aaa Lys	gat Asp 400	1200
ggg Gly	tct Ser	gat Asp	ttg Leu	aaa Lys 405	tgg Trp	gtt Val	gaa Glu	gta Val	cct Pro 410	gat Asp	tgt Cys	ttc Phe	tgt Cys	ttc Phe	cac His 415	1248
ctc Leu	tgg Trp	aat Asn	gct Ala 420	tgg Trp	gaa Glu	gaa Glu	gca Ala	gaa Glu 425	aca Thr	gat Asp	gaa Glu	atc Ile	gtt Val 430	gta Val	att Ile	1296
ggg Gly	tca Ser	tgt Cys	atg Met	aca Thr	cca Pro	cca Pro	gac Asp 440	tcc Ser	att Ile	ttc Phe	aat Asn	gaa Glu 445	tgt Cys	gat Asp	gaa Glu	1344
ggg Gly	cta Leu 450	aag Lys	agt Ser	gtt Val	tta Leu	tcc Ser 455	gaa Glu	atc Ile	cgt Arg	ctc Leu	aat Asn 460	ttg Leu	aaa Lys	aca Thr	ggg Gly	1392
aaa Lys 465	tca Ser	aca Thr	aga Arg	aaa Lys	tcc Ser 470	ata Ile	atc Ile	gaa Glu	aac Asn	ccg Pro 475	gat Asp	gaa Glu	caa Gln	gtg Val	aat Asn 480	1440
tta Leu	gaa Glu	gct Ala	gga Gly	atg Met 485	gtg Val	aac Asn	cga Arg	aac Asn	aaa Lys 490	ctc Leu	gga Gly	agg Arg	aaa Lys	aca Thr 495	gag Glu	1488

tat gct tat ttg gct atc gct gaa cca tgg cca aaa gtt tct ggt ttt 1536  
 Tyr Ala Tyr Leu Ala Ile Ala Glu Pro Trp Pro Lys Val Ser Gly Phe  
 500 505 510

gca aaa gta aac ctg ttc acc ggt gaa gtt gag aaa ttc att tat ggt 1584  
 Ala Lys Val Asn Leu Phe Thr Gly Glu Val Glu Lys Phe Ile Tyr Gly  
 515 520 525

gac aac aaa tat ggt ggg gaa cct ctt ttt tta cca aga gac ccc aac 1632  
 Asp Asn Lys Tyr Gly Gly Glu Pro Leu Phe Leu Pro Arg Asp Pro Asn  
 530 535 540

agc aag gaa gaa gac gat ggt tat att tta gct ttc gtt cac gat gag 1680  
 Ser Lys Glu Glu Asp Asp Gly Tyr Ile Leu Ala Phe Val His Asp Glu  
 545 550 555 560

aaa gaa tgg aaa tca gaa ctg caa att gtt aac gca atg agt ttg aag 1728  
 Lys Glu Trp Lys Ser Glu Leu Gln Ile Val Asn Ala Met Ser Leu Lys  
 565 570 575

ttg gag gca act gtg aag ctt cca tca aga gtt cct tat gga ttt cat 1776  
 Leu Glu Ala Thr Val Lys Leu Pro Ser Arg Val Pro Tyr Gly Phe His  
 580 585 590

gga aca ttc ata aac gcc aat gat ttg gca aat cag gca tga 1818  
 Gly Thr Phe Ile Asn Ala Asn Asp Leu Ala Asn Gln Ala  
 595 600 605

<210> 16

<211> 605

<212> PRT

<213> Lycopersicon esculentum

<400> 16

Met Ala Thr Thr Thr Ser His Ala Thr Asn Thr Trp Ile Lys Thr Lys  
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Leu Ser Met Pro Ser Ser Lys Glu Phe Gly Phe Ala Ser Asn Ser Ile  
 20 25 30

Ser Leu Leu Lys Asn Gln His Asn Arg Gln Ser Leu Asn Ile Asn Ser  
 35 40 45

Ser Leu Gln Ala Pro Pro Ile Leu His Phe Pro Lys Gln Ser Ser Asn  
 50 55 60

Tyr Gln Thr Pro Lys Asn Asn Thr Ile Ser His Pro Lys Gln Glu Asn  
 65 70 75 80

Asn Asn Ser Ser Ser Ser Ser Thr Ser Lys Trp Asn Leu Val Gln Lys  
 85 90 95

Ala Ala Ala Met Ala Leu Asp Ala Val Glu Ser Ala Leu Thr Lys His  
 100 105 110

Glu Leu Glu His Pro Leu Pro Lys Thr Ala Asp Pro Arg Val Gln Ile  
 115 120 125



Ser Gly Asn Phe Ala Pro Val Pro Glu Asn Pro Val Cys Gln Ser Leu  
 130 135 140  
 Pro Val Thr Gly Lys Ile Pro Lys Cys Val Gln Gly Val Tyr Val Arg  
 145 150 155 160  
 Asn Gly Ala Asn Pro Leu Phe Glu Pro Thr Ala Gly His His Phe Phe  
 165 170 175  
 Asp Gly Asp Gly Met Val His Ala Val Gln Phe Lys Asn Gly Ser Ala  
 180 185 190  
 Ser Tyr Ala Cys Arg Phe Thr Glu Thr Glu Arg Leu Val Gln Glu Lys  
 195 200 205  
 Ala Leu Gly Arg Pro Val Phe Pro Lys Ala Ile Gly Glu Leu His Gly  
 210 215 220  
 His Ser Gly Ile Ala Arg Leu Met Leu Phe Tyr Ala Arg Gly Leu Phe  
 225 230 235 240  
 Gly Leu Val Asp His Ser Lys Gly Thr Gly Val Ala Asn Ala Gly Leu  
 245 250 255  
 Val Tyr Phe Asn Asn Arg Leu Leu Ala Met Ser Glu Asp Asp Leu Pro  
 260 265 270  
 Tyr His Val Lys Val Thr Pro Thr Gly Asp Leu Lys Thr Glu Gly Arg  
 275 280 285  
 Phe Asp Phe Asp Gly Gln Leu Lys Ser Thr Met Ile Ala His Pro Lys  
 290 295 300  
 Leu Asp Pro Val Ser Gly Glu Leu Phe Ala Leu Ser Tyr Asp Val Ile  
 305 310 315 320  
 Gln Lys Pro Tyr Leu Lys Tyr Phe Arg Phe Ser Lys Asn Gly Glu Lys  
 325 330 335  
 Ser Asn Asp Val Glu Ile Pro Val Glu Asp Pro Thr Met Met His Asp  
 340 345 350  
 Phe Ala Ile Thr Glu Asn Phe Val Val Ile Pro Asp Gln Gln Val Val  
 355 360 365  
 Phe Lys Met Ser Glu Met Ile Arg Gly Gly Ser Pro Val Val Tyr Asp  
 370 375 380  
 Lys Asn Lys Val Ser Arg Phe Gly Ile Leu Asp Lys Tyr Ala Lys Asp  
 385 390 395 400  
 Gly Ser Asp Leu Lys Trp Val Glu Val Pro Asp Cys Phe Cys Phe His  
 405 410 415  
 Leu Trp Asn Ala Trp Glu Glu Ala Glu Thr Asp Glu Ile Val Val Ile  
 420 425 430

130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390 400 410 420 430

Gly Ser Cys Met Thr Pro Pro Asp Ser Ile Phe Asn Glu Cys Asp Glu  
435 440 445

Gly Leu Lys Ser Val Leu Ser Glu Ile Arg Leu Asn Leu Lys Thr Gly  
450 455 460

Lys Ser Thr Arg Lys Ser Ile Ile Glu Asn Pro Asp Glu Gln Val Asn  
465 470 475 480

Leu Glu Ala Gly Met Val Asn Arg Asn Lys Leu Gly Arg Lys Thr Glu  
485 490 495

Tyr Ala Tyr Leu Ala Ile Ala Glu Pro Trp Pro Lys Val Ser Gly Phe  
500 505 510

Ala Lys Val Asn Leu Phe Thr Gly Glu Val Glu Lys Phe Ile Tyr Gly  
515 520 525

Asp Asn Lys Tyr Gly Gly Glu Pro Leu Phe Leu Pro Arg Asp Pro Asn  
530 535 540

Ser Lys Glu Glu Asp Asp Gly Tyr Ile Leu Ala Phe Val His Asp Glu  
545 550 555 560

Lys Glu Trp Lys Ser Glu Leu Gln Ile Val Asn Ala Met Ser Leu Lys  
565 570 575

Leu Glu Ala Thr Val Lys Leu Pro Ser Arg Val Pro Tyr Gly Phe His  
580 585 590

Gly Thr Phe Ile Asn Ala Asn Asp Leu Ala Asn Gln Ala  
595 600 605

<210> 17

<211> 1617

<212> DNA

<213> Arabidopsis thaliana

<220>

<221> CDS

<222> (1)..(1614)

<400> 17

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aga ccc tcc aag ggt ttc tcc tcg aag ctt ctc gat ctt ctc gag aga 96  
Arg Pro Ser Lys Gly Phe Ser Ser Lys Leu Leu Asp Leu Leu Glu Arg  
20 25 30

ctt gtc gtc aag ctc atg cac gat gct tct ctc cct ctc cac tac ctc 144  
Leu Val Val Lys Leu Met His Asp Ala Ser Leu Pro Leu His Tyr Leu  
35 40 45

tca ggc aac ttc gct ccc atc cgt gat gaa act cct ccc gtc aag gat	192
Ser Gly Asn Phe Ala Pro Ile Arg Asp Glu Thr Pro Pro Val Lys Asp	
50 55 60	
ctc ccc gtc cat gga ttt ctt ccc gaa tgc ttg aat ggt gaa ttt gtg	240
Leu Pro Val His Gly Phe Leu Pro Glu Cys Leu Asn Gly Glu Phe Val	
65 70 75 80	
agg gtt ggt cca aac ccc aag ttt gat gct gtc gct gga tat cac tgg	288
Arg Val Gly Pro Asn Pro Lys Phe Asp Ala Val Ala Gly Tyr His Trp	
85 90 95	
ttt gat gga gat ggg atg att cat ggg gta cgc atc aaa gat ggg aaa	336
Phe Asp Gly Asp Gly Met Ile His Gly Val Arg Ile Lys Asp Gly Lys	
100 105 110	
gct act tat gtt tct cga tat gtt aag aca tca cgt ctt aag cag gaa	384
Ala Thr Tyr Val Ser Arg Tyr Val Lys Thr Ser Arg Leu Lys Gln Glu	
115 120 125	
gag ttc ttc gga gct gcc aaa ttc atg aag att ggt gac ctt aag ggg	432
Glu Phe Phe Gly Ala Ala Lys Phe Met Lys Ile Gly Asp Leu Lys Gly	
130 135 140	
ttt ttc gga ttg cta atg gtc aat atc caa cag ctg aga acg aag ctc	480
Phe Phe Gly Leu Leu Met Val Asn Ile Gln Gln Leu Arg Thr Lys Leu	
145 150 155 160	
aaa ata ttg gac aac act tat gga aat gga act gcc aat aca gca ctc	528
Lys Ile Leu Asp Asn Thr Tyr Gly Asn Gly Thr Ala Asn Thr Ala Leu	
165 170 175	
gta tat cac cat gga aaa ctt cta gca tta cag gag gca gat aag ccg	576
Val Tyr His His Gly Lys Leu Leu Ala Leu Gln Glu Ala Asp Lys Pro	
180 185 190	
tac gtc atc aaa gtt ttg gaa gat gga gac ctg caa act ctt ggt ata	624
Tyr Val Ile Lys Val Leu Glu Asp Gly Asp Leu Gln Thr Leu Gly Ile	
195 200 205	
ata gat tat gac aag aga ttg acc cac tcc ttc act gct cac cca aaa	672
Ile Asp Tyr Asp Lys Arg Leu Thr His Ser Phe Thr Ala His Pro Lys	
210 215 220	
gtt gac ccg gtt acg ggt gaa atg ttt aca ttc ggc tat tcg cat acg	720
Val Asp Pro Val Thr Gly Glu Met Phe Thr Phe Gly Tyr Ser His Thr	
225 230 235 240	
cca cct tat ctc aca tac aga gtt atc tcg aaa gat ggc att atg cat	768
Pro Pro Tyr Leu Thr Tyr Arg Val Ile Ser Lys Asp Gly Ile Met His	
245 250 255	
gac cca gtc cca att act ata tca gag cct atc atg atg cat gat ttt	816
Asp Pro Val Pro Ile Thr Ile Ser Glu Pro Ile Met Met His Asp Phe	
260 265 270	

gct att act gag act tat gca atc ttc atg gat ctt cct atg cac ttc	864
Ala Ile Thr Glu Thr Tyr Ala Ile Phe Met Asp Leu Pro Met His Phe	
275 280 285	
agg cca aag gaa atg gtg aaa gag aag aaa atg ata tac tca ttt gat	912
Arg Pro Lys Glu Met Val Lys Glu Lys Lys Met Ile Tyr Ser Phe Asp	
290 295 300	
ccc aca aaa aag gct cgt ttt ggt gtt ctt ccg cgc tat gcc aag gat	960
Pro Thr Lys Lys Ala Arg Phe Gly Val Leu Pro Arg Tyr Ala Lys Asp	
305 310 315 320	
gaa ctt atg att aga tgg ttt gag ctt ccc aac tgc ttt att ttc cac	1008
Glu Leu Met Ile Arg Trp Phe Glu Leu Pro Asn Cys Phe Ile Phe His	
325 330 335	
aac gcc aat gct tgg gaa gaa gag gat gaa gtc gtc ctc atc act tgt	1056
Asn Ala Asn Ala Trp Glu Glu Glu Asp Glu Val Val Leu Ile Thr Cys	
340 345 350	
cgt ctt gag aat cca gat ctt gac atg gtc agt ggg aaa gtg aaa gaa	1104
Arg Leu Glu Asn Pro Asp Leu Asp Met Val Ser Gly Lys Val Lys Glu	
355 360 365	
aaa ctc gaa aat ttt ggc aac gaa ctg tac gaa atg aga ttc aac atg	1152
Lys Leu Glu Asn Phe Gly Asn Glu Leu Tyr Glu Met Arg Phe Asn Met	
370 375 380	
aaa acg ggc tca gct tct caa aaa aaa cta tcc gca tct gcg gtt gat	1200
Lys Thr Gly Ser Ala Ser Gln Lys Lys Leu Ser Ala Ser Ala Val Asp	
385 390 395 400	
ttc ccc aga atc aat gag tgc tac acc gga aag aaa cag aga tac gta	1248
Phe Pro Arg Ile Asn Glu Cys Tyr Thr Gly Lys Lys Gln Arg Tyr Val	
405 410 415	
tat gga aca att ctg gac agt atc gca aag gtt acc gga atc atc aag	1296
Tyr Gly Thr Ile Leu Asp Ser Ile Ala Lys Val Thr Gly Ile Ile Lys	
420 425 430	
ttt gat ctg cat gca gaa gct gag aca ggg aaa aga atg ctg gaa gta	1344
Phe Asp Leu His Ala Glu Ala Glu Thr Gly Lys Arg Met Leu Glu Val	
435 440 445	
gga ggt aat atc aaa gga ata tat gac ctg gga gaa ggc aga tat ggt	1392
Gly Gly Asn Ile Lys Gly Ile Tyr Asp Leu Gly Glu Gly Arg Tyr Gly	
450 455 460	
tca gag gct atc tat gtt ccg cgt gag aca gca gaa gaa gac gac ggt	1440
Ser Glu Ala Ile Tyr Val Pro Arg Glu Thr Ala Glu Glu Asp Asp Gly	
465 470 475 480	
tac ttg ata ttc ttt gtt cat gat gaa aac aca ggg aaa tca tgc gtg	1488
Tyr Leu Ile Phe Phe Val His Asp Glu Asn Thr Gly Lys Ser Cys Val	
485 490 495	

act gtg ata gac gca aaa aca atg tcg gct gaa ccg gtg gca gtg gtg 1536  
 Thr Val Ile Asp Ala Lys Thr Met Ser Ala Glu Pro Val Ala Val Val  
 500 505 510

gag ctg ccg cac agg gtc cca tat ggc ttc cat gcc ttg ttt gtt aca 1584  
 Glu Leu Pro His Arg Val Pro Tyr Gly Phe His Ala Leu Phe Val Thr  
 515 520 525

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<210> 18

<211> 538

<212> PRT

<213> Arabidopsis thaliana

<400> 18

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Arg Pro Ser Lys Gly Phe Ser Ser Lys Leu Leu Asp Leu Leu Glu Arg  
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Leu Val Val Lys Leu Met His Asp Ala Ser Leu Pro Leu His Tyr Leu  
 35 40 45

Ser Gly Asn Phe Ala Pro Ile Arg Asp Glu Thr Pro Pro Val Lys Asp  
 50 55 60

Leu Pro Val His Gly Phe Leu Pro Glu Cys Leu Asn Gly Glu Phe Val  
 65 70 75 80

Arg Val Gly Pro Asn Pro Lys Phe Asp Ala Val Ala Gly Tyr His Trp  
 85 90 95

Phe Asp Gly Asp Gly Met Ile His Gly Val Arg Ile Lys Asp Gly Lys  
 100 105 110

Ala Thr Tyr Val Ser Arg Tyr Val Lys Thr Ser Arg Leu Lys Gln Glu  
 115 120 125

Glu Phe Phe Gly Ala Ala Lys Phe Met Lys Ile Gly Asp Leu Lys Gly  
 130 135 140

Phe Phe Gly Leu Leu Met Val Asn Ile Gln Gln Leu Arg Thr Lys Leu  
 145 150 155 160

Lys Ile Leu Asp Asn Thr Tyr Gly Asn Gly Thr Ala Asn Thr Ala Leu  
 165 170 175

Val Tyr His His Gly Lys Leu Leu Ala Leu Gln Glu Ala Asp Lys Pro  
 180 185 190

Tyr Val Ile Lys Val Leu Glu Asp Gly Asp Leu Gln Thr Leu Gly Ile  
 195 200 205

Ile Asp Tyr Asp Lys Arg Leu Thr His Ser Phe Thr Ala His Pro Lys  
 210 215 220  
 Val Asp Pro Val Thr Gly Glu Met Phe Thr Phe Gly Tyr Ser His Thr  
 225 230 235 240  
 Pro Pro Tyr Leu Thr Tyr Arg Val Ile Ser Lys Asp Gly Ile Met His  
 245 250 255  
 Asp Pro Val Pro Ile Thr Ile Ser Glu Pro Ile Met Met His Asp Phe  
 260 265 270  
 Ala Ile Thr Glu Thr Tyr Ala Ile Phe Met Asp Leu Pro Met His Phe  
 275 280 285  
 Arg Pro Lys Glu Met Val Lys Glu Lys Lys Met Ile Tyr Ser Phe Asp  
 290 295 300  
 Pro Thr Lys Lys Ala Arg Phe Gly Val Leu Pro Arg Tyr Ala Lys Asp  
 305 310 315 320  
 Glu Leu Met Ile Arg Trp Phe Glu Leu Pro Asn Cys Phe Ile Phe His  
 325 330 335  
 Asn Ala Asn Ala Trp Glu Glu Glu Asp Glu Val Val Leu Ile Thr Cys  
 340 345 350  
 Arg Leu Glu Asn Pro Asp Leu Asp Met Val Ser Gly Lys Val Lys Glu  
 355 360 365  
 Lys Leu Glu Asn Phe Gly Asn Glu Leu Tyr Glu Met Arg Phe Asn Met  
 370 375 380  
 Lys Thr Gly Ser Ala Ser Gln Lys Lys Leu Ser Ala Ser Ala Val Asp  
 385 390 395 400  
 Phe Pro Arg Ile Asn Glu Cys Tyr Thr Gly Lys Lys Gln Arg Tyr Val  
 405 410 415  
 Tyr Gly Thr Ile Leu Asp Ser Ile Ala Lys Val Thr Gly Ile Ile Lys  
 420 425 430  
 Phe Asp Leu His Ala Glu Ala Glu Thr Gly Lys Arg Met Leu Glu Val  
 435 440 445  
 Gly Gly Asn Ile Lys Gly Ile Tyr Asp Leu Gly Glu Gly Arg Tyr Gly  
 450 455 460  
 Ser Glu Ala Ile Tyr Val Pro Arg Glu Thr Ala Glu Glu Asp Asp Gly  
 465 470 475 480  
 Tyr Leu Ile Phe Phe Val His Asp Glu Asn Thr Gly Lys Ser Cys Val  
 485 490 495  
 Thr Val Ile Asp Ala Lys Thr Met Ser Ala Glu Pro Val Ala Val Val  
 500 505 510

Glu Leu Pro His Arg Val Pro Tyr Gly Phe His Ala Leu Phe Val Thr  
 515 520 525

Glu Glu Gln Leu Gln Glu Gln Thr Leu Ile  
 530 535

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<220>  
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27

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38

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36

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 <212> DNA

<213> Artificial Sequence

<220>

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<400> 23

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29

<210> 24

<211> 31

<212> DNA

<213> Artificial Sequence

<220>

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<400> 24

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31

<210> 25

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

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33

<210> 26

<211> 34

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 26

attgaattct taaagcttat taaggtcact ttcc

34

<210> 27

<211> 35

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

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aagaattcat ggcggagaaa ctcaagtgatg gcagc

35



<210> 28  
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 <212> DNA  
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<220>  
 <223> Description of Artificial Sequence: Primer

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 aaaagaattc ggcttatata agagtttggt cctgg 35

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 <212> DNA  
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<220>  
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<400> 29  
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<210> 30  
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 <211> 32  
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<220>  
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<400> 31  
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<210> 32  
 <211> 17  
 <212> DNA  
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<400> 32  
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<210> 33  
 <211> 538  
 <212> PRT  
 <213> Arabidopsis thaliana

<400> 33

Met	Ala	Glu	Lys	Leu	Ser	Asp	Gly	Ser	Ile	Ile	Ile	Ser	Val	His	Pro	1	5	10	15
Arg	Pro	Ser	Lys	Gly	Phe	Ser	Ser	Lys	Leu	Leu	Asp	Leu	Leu	Glu	Arg	20	25	30	
Leu	Val	Val	Lys	Leu	Met	His	Asp	Ala	Ser	Leu	Pro	Leu	His	Tyr	Leu	35	40	45	
Ser	Gly	Asn	Phe	Ala	Pro	Ile	Arg	Asp	Glu	Thr	Pro	Pro	Val	Lys	Asp	50	55	60	
Leu	Pro	Val	His	Gly	Phe	Leu	Pro	Glu	Cys	Leu	Asn	Gly	Glu	Phe	Val	65	70	75	
Arg	Val	Gly	Pro	Asn	Pro	Lys	Phe	Asp	Ala	Val	Ala	Gly	Tyr	His	Trp	85	90	95	
Phe	Asp	Gly	Asp	Gly	Met	Ile	His	Gly	Val	Arg	Ile	Lys	Asp	Gly	Lys	100	105	110	
Ala	Thr	Tyr	Val	Ser	Arg	Tyr	Val	Lys	Thr	Ser	Arg	Leu	Lys	Gln	Glu	115	120	125	
Glu	Phe	Phe	Gly	Ala	Ala	Lys	Phe	Met	Lys	Ile	Gly	Asp	Leu	Lys	Gly	130	135	140	
Phe	Phe	Gly	Leu	Leu	Met	Val	Asn	Val	Gln	Gln	Leu	Arg	Thr	Lys	Leu	145	150	155	
Lys	Ile	Leu	Asp	Asn	Thr	Tyr	Gly	Asn	Gly	Thr	Ala	Asn	Thr	Ala	Leu	165	170	175	
Val	Tyr	His	His	Gly	Lys	Leu	Leu	Ala	Leu	Gln	Glu	Ala	Asp	Lys	Pro	180	185	190	
Tyr	Val	Ile	Lys	Val	Leu	Glu	Asp	Gly	Asp	Leu	Gln	Thr	Leu	Gly	Ile	195	200	205	
Ile	Asp	Tyr	Asp	Lys	Arg	Leu	Thr	His	Ser	Phe	Thr	Ala	His	Pro	Lys	210	215	220	
Val	Asp	Pro	Val	Thr	Gly	Glu	Met	Phe	Thr	Phe	Gly	Tyr	Ser	His	Thr	225	230	235	
Pro	Pro	Tyr	Leu	Thr	Tyr	Arg	Val	Ile	Ser	Lys	Asp	Gly	Ile	Met	His	245	250	255	
Asp	Pro	Val	Pro	Ile	Thr	Ile	Ser	Glu	Pro	Ile	Met	Met	His	Asp	Phe	260	265	270	

Ala Ile Thr Glu Thr Tyr Ala Ile Phe Met Asp Leu Pro Met His Phe  
 275 280 285  
 Arg Pro Lys Glu Met Val Lys Glu Lys Lys Met Ile Tyr Ser Phe Asp  
 290 295 300  
 Pro Thr Lys Lys Ala Arg Phe Gly Val Leu Pro Arg Tyr Ala Lys Asp  
 305 310 315 320  
 Glu Leu Met Ile Arg Trp Phe Glu Leu Pro Asn Cys Phe Ile Phe His  
 325 330 335  
 Asn Ala Asn Ala Trp Glu Glu Glu Asp Glu Val Val Leu Ile Thr Cys  
 340 345 350  
 Arg Leu Glu Asn Pro Asp Leu Asp Met Val Ser Gly Lys Val Lys Glu  
 355 360 365  
 Lys Leu Glu Asn Phe Gly Asn Glu Leu Tyr Glu Met Arg Phe Asn Met  
 370 375 380  
 Lys Thr Gly Ser Ala Ser Gln Lys Lys Leu Ser Ala Ser Ala Val Asp  
 385 390 395 400  
 Phe Pro Arg Ile Asn Glu Cys Tyr Thr Gly Lys Lys Gln Arg Tyr Val  
 405 410 415  
 Tyr Gly Thr Ile Leu Asp Ser Ile Ala Lys Val Thr Gly Ile Ile Lys  
 420 425 430  
 Phe Asp Leu His Ala Glu Ala Glu Thr Gly Lys Arg Met Leu Glu Val  
 435 440 445  
 Gly Gly Asn Ile Lys Gly Ile Tyr Asp Leu Gly Glu Gly Arg Tyr Gly  
 450 455 460  
 Ser Glu Ala Ile Tyr Val Pro Arg Glu Thr Ala Glu Glu Asp Asp Gly  
 465 470 475 480  
 Tyr Leu Ile Phe Phe Val His Asp Glu Asn Thr Gly Lys Ser Cys Val  
 485 490 495  
 Thr Val Ile Asp Ala Lys Thr Met Ser Ala Glu Pro Val Ala Val Val  
 500 505 510  
 Glu Leu Pro His Arg Val Pro Tyr Gly Phe His Ala Leu Phe Val Thr  
 515 520 525  
 Glu Glu Gln Leu Gln Glu Gln Thr Leu Ile  
 530 535